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HARTCROWSER

Earth and Environmental Technologies

Phase I Environmental Audit
Blair Backup Property
Port of Tacoma, Washington

J-2350-01

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Blair Backup Property
Port of Tacoma, Washington

Prepared for
Port of Tacoma
Tacoma, Washington

October 9, 1989
J-2350-01

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PHASE I ENVIRONMENTAL AUDIT
BLAIR BACKUP PROPERTY
TACOMA, WASHINGTON

This report presents the findings of our Phase I Environmental Audit of the Blair Backup Property in Tacoma, Washington. This property is subject to an environmental audit at this time due to an agreement between the Port of Tacoma (Port) and the Puyallup Indian Tribe (Tribe). The agreement calls for several parcels of land to be transferred from the Port to the Tribe in a condition that is reasonably usable for commercial or industrial development. The purpose of this audit was to identify environmental issues which might interfere with the development of the property.

The Blair Backup Property is approximately 85 acres of land between Taylor Way and Alexander Avenue. Another report prepared by Hart Crowser, Inc., addresses environmental issues related to two small triangular shaped parcels known collectively as the Taylor Way Properties. All of these parcels are shown on Figure 1. Other properties involved in the Port/Tribe land transfer are covered in reports prepared by Landau Associates, Inc.

The process of environmental assessment for property transfer is indicated graphically on Figure 2. The work conducted to date addresses

only Phase I of that process. Typically, Phase I includes a historical characterization of the properties, a regulatory agency file review, and a site reconnaissance. The objectives of these steps are to answer the following questions:

- **Site Historical Characterization.** Does the site history indicate the potential for environmental contamination?

- **Agency File Review.** Is there existing information indicating the presence of environmental contamination or a history of violations at the site?

- **Site Reconnaissance.** Does a first-hand reconnaissance of the site confirm the findings of the site historical characterization and agency file review or provide other indications of contamination?

In answering these three questions, we are able to identify the environmental issues which may adversely effect commercial or industrial development of the property. Additionally, we can recommend what additional site assessments (exploration, sampling, or testing) is necessary to address the identified environmental issues.

Because considerable environmental assessment has been performed on and adjacent to the Blair Backup Property, there is substantial information related to site hydrogeology as well as soil and groundwater quality. A summary of of the pertinent work we know of is presented in this report.

This report begins with a summary of significant findings of our work. More detailed discussion of site information follows the summary. Figure 3 presents historic information showing past and present occupants of the project site and nearby areas. Figures 4, 5, and 6 present information related to site hydrogeology. Figure 7 is a photograph location map. Site photographs are presented in Appendix A. Figure 8 shows the location of monitoring wells located on and near the property. Figure 9 shows the location of some areas of known soil contamination.

This work was completed in accordance with contract E-1192 dated February 22, 1989, between the Port and Hart Crowser, Inc. This work was performed and this report prepared in accordance generally accepted professional practices for the nature of the work completed in the same or similar localities, at the time the work was performed. No other warranty, express or implied, is made.

SUMMARY OF FINDINGS AND CONCLUSIONS

This section provides brief statements of the major findings of our work. Additional discussion and details are provided in subsequent sections.

- Ohio Ferro-Alloys Corporation operated the major industrial facility on the site. The chromium and ferrosilicate manufacturing plant, which occupied the northeast corner of

the site, was built in 1941 and remained until 1974.

- Log sorting yards have been present on parts of the site since 1974. Asarco slag is likely present on the site.

- Commercial operations have been active on the northern portion of the site for about 15 years. These operations currently include a truck repair shop and a vehicle steam-cleaning facility.

- Adjacent land uses include three major industrial facilities: Kaiser Aluminum, Reichhold Chemical, and Pennwalt Chemical.

Based on these findings, we believe that there is potential for on-site soil and groundwater contamination related to:

- Solid and liquid waste from Ohio Ferro-Alloys;
- Asarco slag mixed with wood waste; and
- Wastes from current on-site commercial operations, including steam-cleaning runoff and sand blast waste.

Additionally, there is known or likely soil and groundwater contamination on-site resulting from the following off-site activities:

- Chemical releases on and around the Reichhold Chemical facility which have resulted in soil and groundwater contamination; and

- Infiltration of waste water and settling of sludge from Kaiser wet scrubbers.

Site reconnaissance of the property generally confirmed these concerns and identified the additional issue of recent soil and debris disposal on the site.

Our review of the regulatory agency files indicates that while there is little information related to activities on-site; the information related to adjacent industrial activities is plentiful. In particular, numerous spills and permitted discharges are documented. Both Kaiser and Reichhold are at various stages in regulatory permit processes for storage and disposal of hazardous waste.

Site hydrogeology is generally well characterized as a result of studies focusing on adjacent parcels. The site is typically described as having an upper, intermediate, and deep aquifer separated by less permeable aquitard units. Groundwater flow is generally lateral toward the Hylebos and Blair Waterways with a minor component of downward flow. Groundwater from both Reichhold and Kaiser does flow beneath the Blair Backup Property. While considerable soil and groundwater quality information exists for some areas, the existing information is not sufficient to characterize the northern and central areas of the site.

Based on the information obtained to date, the environmental issues identified do not adversely effect commercial or industrial development of

the property. In addition, we believe that two general actions are appropriate:

- The Port should remain involved with ongoing corrective action programs or cleanups on adjacent properties to assure that acceptable final cleanup levels are achieved.

- The Port should implement a program of soil and groundwater sampling on the project site to supplement existing information on site environmental conditions and to assess whether cleanup efforts are warranted.

SITE HISTORICAL CHARACTERIZATION

The history of land use activities on and adjacent to the site was researched to identify past activities or uses which could have caused site contamination. For the purposes of this historical review, the study area was defined as encompassing property on both sides of Alexander Avenue, Lincoln Avenue, and Taylor Way.

Information Sources

We reviewed the following sources:

- Historic aerial photographs (U.S. Army Corps of Engineers, 1942 and 1986; Pacific Aerial Surveys 1961, 1965, and 1970; Washington Department of Natural Resources 1984 and 1985; and CH2M Hill 1986);
- Topographic maps (U.S. Geological Survey 1949, 1961 and 1961 photo-revised to 1981);

- Historic fire insurance maps (Sanborn 1905, 1917, and 1912 corrected to 1950); and
- Tacoma street directories (R.L. Polk 1928, 1933, 1938, 1943, 1947, 1953, 1958, 1961, 1966, 1967, 1968, 1971, 1973, 1978, 1983, and 1987).

In addition to those sources, we used reports and associated job files related to environmental and geotechnical work conducted in the Port of Tacoma area by Hart Crowser. Also, aerial photographs, maps, and real estate files at the Port of Tacoma were reviewed for relevant information. The Tacoma Building Department was also contacted for historic building permit information. Additionally, we interviewed William Kittrel (Port) and Paul Schmiel (Kaiser). Listings of known activity on and adjacent to the site are presented in Tables 1 and 2 at the end of the text. A summary of historical business activities is presented on Figure 3.

Historic Site Use

Before its development in the early 1940s, the site was a part of the Commencement Bay lowlands. Filling in the 1920s and 1930s provided the base for the first known use of this site by the Ohio Ferro-Alloys Corporation. The facility appears to have been built on fill, while surrounding land remained at original grade. Aerial photos suggest a wetlands condition surrounded the facility and a large pond existed on the property. This area appears

to have received fill material and possibly wastes from the plant over time.

In 1941-42 this Ohio-based metals refining company constructed a chromium smelter on the northeast corner of the site (see Figure 3). When ore procurement became difficult in the latter stages of World War Two, it converted to silicate and ferrosilicate production. The plant was demolished in 1974 and the Port of Tacoma obtained title to the land. Between 1974 and 1987, the Port leased the northeast leg of the site to lumber companies for log sorting and storage. In 1987, the Port of Tacoma leased the entire site to the Puyallup Indian Tribe. Other current occupants of the site include a truck repair shop and a vehicle steam-cleaning facility.

Pennwalt Corporation, whose production facilities are presently located east of the site, across Taylor Avenue, was a second past occupant of the project property, having built an administrative office on the north end of the site in the late 1930s.

Although the remainder of the site has remained commercially undeveloped, Kaiser Aluminum built a settling basin on the southeast part of the property for wet scrubber water (Figure 7). Between 1950 and 1974, when they converted to dry scrubbers, water was diverted to the basin where solids were separated and taken away for disposal at a landfill.

Historic Use of Adjacent Properties

The first major use of adjacent property was in 1928-29 when Pennwalt Corporation built a chlorine manufacturing plant northeast of the site (see Figure 3). In 1937, Wypenn Oil, a fish oil refining plant, began operations on a triangle-shaped lot between the two eastern legs of the parcel on Taylor Way. During the 1940s, Western Charcoal also operated briefly on that property. The nature of Western Charcoal's operations are unknown. Pennwalt later operated a pesticide research facility on this same parcel. Tacoma Sash & Door, a wood working operation, began operations northwest of the parcel in the 1930s in the area presently occupied by Reichhold Chemical.

There was additional industrial development in the area in the 1940s and 1950s as new land was created from dredge fill material. In 1943, the Defense Department built an aluminum manufacturing plant south of the site. It was operated by the Olin Corporation until 1946 when it was acquired by Kaiser Aluminum. Except for a shutdown between 1958 and 1964, the plant has produced bulk aluminum ingots and rods, doubling its capacity in 1968. Tacoma City Light established an electrical sub-station across Taylor Way from Kaiser Aluminum in the 1950s. Also in the 1950s, insulation manufacturing and foundry operations developed northwest of the property near Lincoln Avenue. The prominent adjacent property developed in the 1950s was Reichhold Chemical, whose chemicals manufacturing plant was located off the

intersection of Lincoln and Alexander avenues, and whose laboratory was located immediately east of the northwest leg of the parcel. Since 1956, Reichhold has manufactured a variety of chemical products including pentachlorophenol, resins, and treated fiber products.

What P treated fiber?

Historic Potential for Contamination

On-Site Sources. Based on past uses of the site, there is reasonable potential for soil and groundwater contamination. The report sections from the agency file review, hydrogeology, and site reconnaissance elaborate the potential concerns from historical activities discussed below.

The primary potential on-site sources of contamination would be the former Ohio Ferro-Alloys plant as well as the log sort and storage activities that have occurred on the project property since the mid-1970s.

The Ohio Ferro-Alloys plant consisted of a furnace house, oil house, work shop, and a bank of transformers at the plant. Although in 1950 the furnaces were electrically powered, which means there may have been a potential for a release of PCBs from electrical transformers, the furnaces may have been oil fired at one time (the plant was also heated with oil). There may have been underground oil storage tanks. We could not, however, confirm the existence of such tanks in historical data. The work shop was probably used in maintaining and repairing plant equipment. Waste materials likely to have been

generated from the smelting plant include slag, ash, scrap metal, and waste water. Minor amounts of chemicals such as solvents or oils may have been handled and released. Leakage from underground storage tanks, if present, may have occurred.

Potential contamination associated with log sorting activities may result from mixtures of wood waste and Asarco slag. This combination of materials, combined with the crushing action of log sorting machinery traffic, can result in release of leached metals to groundwater and surface water.

Off-Site Sources. Based on past uses of adjacent properties, there is the potential for off-site contaminants to have migrated onto the project property. The primary sources of potential off-site contamination would be Kaiser Aluminum, Reichhold Chemical, and Pennwalt Chemical. Other potential sources of contamination would be wood products manufacturing (Tacoma Sash & Door), fish oil production and storage (Wypenn Oil), transformer yards (City of Tacoma), and foundry operations (Acme Foundry) that occurred adjacent to the parcel. Wastes associated with aluminum production include pot-lining waste (containing coal tar pitch, carbon fluoride, and alumina), wet scrubber waste, and possibly oils or solvents. Some chemical wastes from Reichhold Chemical are known to have been deposited on part of the Blair Backup Property. Since most of Pennwalt's facilities are across Taylor Way and hydrogeologically downgradient of the Blair

Is this the Arsenic material?

(does Reichhold have liability here?)

Backup Property, contamination from this source is less likely. The portion of Pennwalt's operations directly adjacent to the Blair Backup Property, handled pesticides and may therefore be a potential source of these compounds to the site. Also, the three storage tanks on the Pennwalt site are believed to contain liquid sodium hydroxide.

Surface or gw still downgradient

can we ascertain? is this also the adjacent land?

AGENCY FILE REVIEW

The primary purpose of a regulatory agency file review is to ascertain the compliance issues associated with an industry or property. Correspondence between the agency and the affected party, industrial discharge permits, waste management permits and applications, agency inspections, and agency complaint files, all contribute to an understanding of the facility's regulatory status. To accomplish our file review, we reviewed records from the U.S. Environmental Protection Agency (EPA), U.S. Coast Guard (USCG), Washington State Department of Ecology (Ecology), Tacoma-Pierce County Health Department (TPCHD), and the local fire department. The primary objective of the review was to identify any documented releases of chemicals on or near the subject property.

Based on proximity to the property, we selected the following list of industrial and commercial operations for file review:

- Reichhold Chemicals, Inc.
- Kaiser Aluminum & Chemical Corp.

- o Pennwalt Corp.
- o Pennwalt - Pesticides Laboratory
- o Domtar Gypsum America, Inc.
- o Dunlap Towing
- o Murray Pacific Corp.
- o Port of Tacoma - Graving Dock re: J.A. Jones Construction
- o Port of Tacoma - Graving Dock re: Kiewit Grace
- o Cascade Timber No. 2
- o Hooker (or Occidental) Chemical Co.
- o Bonneville Power Admin. Substation

Written requests were made to EPA, USCG, and Ecology, and telephone requests were made to the fire department and TPCHD. When files were made available by the agencies, they were reviewed by Hart Crowser staff.

The major industrial facilities surrounding the property all have a history of spills or permitted discharges of hazardous chemicals. Most of these, because of the distance at which they occurred from the Port's property, may not be relevant to our discussion of environmental issues on the property itself. For the purpose of this document, we restricted our discussion to those releases, permitted or not, which we believe have had an effect on the property.

Kaiser. Until 1974, Kaiser discharged emissions control scrubber water to a settling basin, as previously discussed, where solids were allowed to settle. Parts of this basin are on the Port's property (see Figure 7). In the 24 years of scrubber system operation,

approximately 82,000 cubic yards of solids were generated and remain on-site. The sludge consists mainly of alumina, carbon, fluoride compounds, and coal tar pitch derivatives. The coal tar pitch derivatives in the sludge, polycyclic aromatic hydrocarbons, may range as high as 5 percent by weight, or 50,000 ppm. Kaiser has consolidated the sludge on-site and is currently seeking Ecology approval to further consolidate the material and provide a soil cover.

Reichhold. Reichhold maintained and routinely used a spoils disposal area. Records document that at least 23,000 cubic yards of calcium chloride and waste treatment system sludge have been deposited in the spoil area. In addition, a northward extension of the spoils area was operated between 1966 and 1973. A series of trenches were used to dispose of chlorinated phenol wastes and covered with several feet of soil. The area was also reported to be used to dispose of drums of still bottoms from the orthobenzyl-parachlorophenol (OBPCP) process.

Four unlined surface impoundments were used to treat wastewater and stormwater generated at Reichhold. In addition, at least nine documented spills of various hazardous chemicals were routed to the ponds from 1974 to 1985. The chemicals included hydrochloric acid, sodium hydroxide, phenol, propylene glycol, chlorophenol, and butyl acrylate.

Puget Chemco leased an area in the northeast corner of the Reichhold property and

manufactured solid calcium chloride from Reichhold solutions. Previous soil sampling in the area indicates contamination.

Three areas on Port property, known as solid waste management units 33, 44, and 49 (see Figure 7) as well as off-site drainage ditches have been studied as part of Reichhold's Part B permit process. That work indicated the presence of a variety of chemicals present in these areas.

Reichhold is currently implementing an interim corrective action program. The interim corrective action proposed by Reichhold (CH2M Hill, 1988) involves the following components:

- A shallow interceptor drain will be installed around the perimeter of the Reichhold Plant site. This drain is designed to collect contaminated groundwater in the shallow aquifer and divert it to an on-site treatment system.

- An intermediate aquifer groundwater extraction and collection system will be installed. This system is designed to remove and treat contaminated groundwater from the intermediate aquifer.

- A water treatment system for use on-site is proposed. This system will accept groundwater from the shallow aquifer interceptor trench and the intermediate aquifer extraction system. The treatment processes will include filtration, chemical

oxidation, and granular activated carbon adsorption.

- A site cap and surface water drainage system will be installed. The site cap will consist of both asphalt and concrete paving.

- Contaminated soils from solid waste management units will be excavated and disposed off site.

Pennwalt. The Pennwalt Company has maintained numerous operations adjacent to the Blair Backup property. Most of these have occurred at Pennwalt's main facility across Taylor Way. The Pennwalt site was developed in the 1920s. The plant primarily produces chlorine, sodium hydroxide, sodium chlorate, sodium hypochlorite, and hydrochloric acid. Agricultural pesticides and herbicides were also produced.

Over the years, numerous waste disposal areas have been operated on the Pennwalt site. For the purpose of this report, the most important of these are the ones on the Pennwalt Ag Chem (Wypenn Oil) site. These include solid waste disposal pits as well as stormwater and wastewater collection ponds.

Other Facilities. Log storage yards on the project site are known to have used Asarco slag as ballast material.

Ohio Ferro-Alloys applied to Ecology for a wastewater discharge permit in 1971. The application requested a discharge quantity of

60,000 gallons per day average. The receiving water was indicated as the Hylebos Waterway via a ditch. Process chemicals and raw materials listed included coal, silica rock, petroleum coke, and refuse wood.

Based on this information from the regulatory agency files, it appears that neighboring facilities have had an impact on the site.

SITE HYDROGEOLOGY

The Blair Backup Property lies within the Puyallup River Basin which is comprised of a thick sequence of deltaic and alluvial sediments occurring to depths of roughly 400 feet in the property vicinity. The sediments consist of a complex interfingering of predominantly sands, silts, and clays related to various growth rates of the delta. As the delta building processes slowed, occasional flooding of the River resulted in a build up of fine-grained silts and clays leaving the native surface of the present property a muddy, marshy tide flat. Subsequent filling, primarily with dredged material from the Blair and Hylebos Waterways in the late 1950s to mid-1960s produced the present property topography.

The hydrogeology of the area around the Blair Backup Property is well known from existing reports on the Reichhold property (CH2M Hill, 1988), the Kaiser property (Kaiser, 1987), and the Pennwalt property (Aware, 1981) and Cascade Timber No. 2 yard (Port property, Ecology and

Environment, 1987). In addition to these reports, specific subsurface information on the eastern portion of the Blair Backup Property is available from work performed by Hart Crowser (1986). These existing data provide the basis for the following discussion of the geologic units and groundwater conditions likely to be encountered beneath the Blair Backup property.

Hydrogeologic Units

The geologic deposits of interest beneath the property include the fill material and the underlying native deltaic and alluvial sediments. These deposits comprise five hydrogeologic units pertinent to the assessment of contamination and contaminant movement from the property. To be consistent with existing reports for the surrounding area the units are delineated as follows:

- shallow aquifer
- upper aquitard
- intermediate aquifer
- lower aquitard
- deep aquifer

The shallow aquifer occurs within fill deposits that most commonly consist of fine to medium sand to silty sand. The fill deposits typically average less than 10 feet in thickness and are reported to range from 1 to 16.5 feet in the surrounding properties. Groundwater is typically encountered between 2 to 8 feet below ground surface under unconfined conditions within the fill material.

The hydraulic conductivity (permeability) of the shallow aquifer is estimated to range from 0.03 to 144 ft/day (10^{-5} to 5 x 10^{-2} cm/sec) in the surrounding properties. This wide range is due to the variable nature of the fill materials.

The upper aquitard is encountered at the native tide flat surface. The aquitard is composed primarily of silt, clayey silt, and organic silt. The thickness of this unit is highly variable probably because of the drainages which laced this former tide flat surface. In the area surrounding the Blair Backup Property, the thickness of the upper aquitard has been estimated to range from 1 to 20 feet.

The intermediate aquifer is a generally a confined groundwater zone that occurs within sand and silty sand deltaic deposits below the upper aquitard. It is the most significant zone with respect to contamination because of its continuity throughout the area, connection with the waterways, and the potential for flow from adjacent properties to the Blair Backup Property (see Figure 5). The thickness of this unit is reported to range from 3 to 38 feet in the surrounding properties.

The permeability of the intermediate aquifer is estimated to range from 0.12 to 144 ft/day (4 x 10^{-5} to 5 x 10^{-2} cm/sec), with a typical average of 3 ft/day (10^{-3} cm/sec).

The lower aquitard separates the intermediate aquifer from the deep aquifer. The aquitard

typically consists of silt, clayey silt, and organic silt with peat. This unit reportedly varies between 3 and 32 feet thick in the area surrounding the Blair Backup Property.

The deep aquifer occurs under confined conditions within sand to silty sand deposits. The aquifer is first encountered at depths of 30 to 80 feet below ground surface. Data from the Pennwalt and Kaiser facilities indicated the deep aquifer was encountered within the shallower depth range while data from the Reichhold investigation generally indicated the deep aquifer below 70 feet in depth. The deep aquifer is estimated to range between 14 and 64 feet in thickness based on data from the Kaiser report. The full thickness of this unit was not penetrated in the deep wells installed for the Reichhold or Pennwalt investigations.

The permeability of the deep aquifer is estimated to range between 1.4 and 144 ft/day (5×10^{-4} to 5×10^{-2} cm/sec) in the surrounding area.

An alternating sequence of deltaic and alluvial silts and sands lie below the deep aquifer to depths of at least 400 feet. Older glacial and interglacial units lie below these valley sediments. It is within these deep, older glacial units that groundwater is tapped for water supply in the area. There are no reported water supply wells that tap deposits shallower than 400 feet. An upward gradient and numerous aquitards restrict the potential for contaminant

migration into the water supply aquifers in this area.

Groundwater Flow Directions and Rates

Groundwater flow within the aquifers is predominantly horizontal. Within the shallow aquifer flow directions are largely influenced by local surface water features such as ponds and drainage ditches. The shallow aquifer is likely not influenced strongly by the tides in this area because it occurs largely above tide levels. Flow directions in the intermediate and deep aquifers are generally toward the Blair and Hylebos Waterways. Flow directions and gradients within these aquifers are influenced by the tides, the deep aquifer generally more so than the intermediate.

Between aquifers there is generally a downward vertical flow component. This downward gradient occurs most consistently between the shallow and intermediate aquifer. Although most commonly downward, an occasional reversal of gradient is indicated between the intermediate and deep aquifers beneath a portion of the Reichhold area because of the tidal response exhibited by the intermediate and deep aquifer. The vertical gradient allows for the downward movement of groundwater; however, the low permeability of the aquitards retards the amount of flow between aquifers. The greatest potential for migration of contaminants to the deeper aquifers occurs when the aquitards are thin or absent.

Groundwater flow directions and velocities reported for the Reichhold and Kaiser facilities indicate a potential for contaminated groundwater to occur beneath the Blair Backup property. A summary map of reported groundwater flow directions for the shallow, intermediate and deep aquifers from these properties is presented on Figures 4, 5, and 6, respectively.

Figure 4 indicates the potential for shallow groundwater from the Reichhold facility to migrate onto the Blair Backup Property. Some groundwater contamination has been identified in the shallow aquifer in the small strip of property along Alexander Avenue. An interceptor trench constructed through the shallow aquifer is planned by Reichhold to remediate local contamination and restrict any further contaminant migration from the shallow aquifer onto adjacent properties.

Water level contour data for the intermediate aquifer from both the Kaiser and Reichhold properties indicate flow toward the Blair Backup Property (Figure 5). A contaminant plume in the intermediate aquifer was identified in the west property area adjacent the Reichhold facility. A groundwater extraction system is planned by Reichhold to remediate the contamination of the intermediate aquifer in this area.

Flow directions within the deep aquifer beneath the Kaiser facility indicate movement toward the Blair Backup Property.

Estimated flow velocities for the shallow and intermediate aquifers as reported in the existing studies based on permeability estimates, gradients, and assumed porosities for the aquifers beneath the respective facilities indicate the following:

- **Shallow Aquifer.** Estimated flow velocity of 3 ft/day from the Kaiser property and 0.0009 to 3.4 ft/day from the Reichhold property.

- **Intermediate Aquifer.** Estimated flow velocity of 2 ft/day from the Kaiser property and 0.0002 to 1.2 ft/day from the Reichhold property.

These flow rates combined with the reported flow directions indicate a potential for contaminants from adjacent sites to occur within groundwater beneath the Blair Backup Property.

SOIL AND GROUNDWATER QUALITY

The purpose of this section is to summarize the nature and extent of known chemical contamination on Blair Backup Property. Information for part of this summary was obtained from Reichhold Chemical Company and Kaiser Aluminum and Chemical Company RCRA Part B applications (CH2M Hill, 1987A, 1987B, 1988, 1989A, 1989B, 1989C, 1989D, 1989E; Ecology and Environmental, 1987; and Landau Associates, 1984). Information in this summary is arranged

by subsections that outline groundwater, surface water, ditch sediment, and soil data quality.

The data presented by CH2M Hill and Landau and summarized here indicate that considerable soil and groundwater contamination on the Blair Backup Property has occurred as a result of waste disposal practices of both Kaiser and Reichhold. Further, while Reichhold's work to date has focused on their property and the land between their site and the Blair Waterway, there is potential for contamination in areas yet unexplored, particularly the northern boundary of the Blair Backup Property.

Existing Monitoring Wells

A number groundwater monitoring wells have been installed on and near the Reichhold Chemical and Kaiser Aluminum properties as part of their regulatory permit work. Several of Reichhold's wells are located on the Blair Backup Property (CH2M Hill, 1989). Adjacent to the southeast end of the Blair Backup Property, Kaiser Aluminum has installed three groundwater monitoring wells (N, T, and Z) in proximity to their setting pond (Landau Associates, 1987A). Five EPA wells are located on the Blair Backup Property (Ecology and Environment, 1987). The locations of these wells are shown on Figure 8.

Groundwater Quality: Reichhold

Reichhold has been monitoring groundwater quality at its facility since 1985 (CH2M Hill, 1988). In that effort, they have installed over

70 monitoring wells. Some of these are on the Blair Backup Property. The results of the monitoring effort conducted by Reichhold have indicated the presence of groundwater contamination both on their facility and on portions of the Blair Backup Property.

Shallow Aquifer Contamination. Volatile organic compounds detected in the shallow aquifer groundwater include acetone, formaldehyde, trichloroethene, trans-1,2-dichloroethene, vinyl chloride, methylene chloride, tetrachloroethene, benzene, and 4-methyl-2-pentanone (CH2M Hill, 1988, 1989A). Semivolatile organic compounds were also detected in wells on the Blair Backup Property. These compounds included bis(2-ethylhextyl)-phthalate, p-tert-butylphenol, 2-methylnaphthalene, naphthalene, 2,3,4,6-tetrachlorophenol, pentachlorophenol, as well as hepta- and octa-chloro furans and dioxins.

Metals were also detected (CH2M Hill, 1989E) in the shallow monitoring wells installed on the Blair Backup Property including MW-275, MW-435, and MW-55S. These included aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, mercury, molybdenum, manganese, nickel, silver, and zinc.

Intermediate Aquifer Contamination. Volatile organic compounds detected in wells installed on the Blair Backup Property include benzene, ethylbenzene, toluene, methylene chloride,

formaldehyde, trans-1,2 dichloroethene, trichloroethene, and vinyl chloride.

Semivolatile organic compounds detected in the intermediate aquifer on the Blair Backup property include benzoic acid, benzyl alcohol, p-tert-butylphenol, 2-chlorophenol, 2,4-dichlorophenol, pentachlorophenol, phenol, 2,3,4,6-tetrachlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 4(1,1-dimethylethyl)-phenol, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, and 4-chloro-3-methylphenol.

Inorganic constituents were also detected in wells screened in the intermediate aquifer on the Blair Backup Property. The constituents detected were generally similar to those detected in the shallow aquifer.

Deep Aquifer Contamination. No wells on the project site are screened in the deep aquifer. Wells screened in the deep aquifer adjacent to the Blair Backup Property contained benzene, formaldehyde trans-1,2-dichloroethene, and several metals.

Ditch Sediment and Surface Water Quality

Reichhold recently completed a ditch sediment and surface water sampling program (CH2M Hill, 1989B). The results of this work indicate relatively few compounds of concern present.

Surface Water Quality. Seven surface water samples were collected from ditches adjacent to the Blair Backup Property. Three surface water

sample were taken from both the south and southeast ditches and one from the RCI ditch (see Figure 7). Formaldehyde was the only volatile compound consistently detected in surface water samples from the south and southeast ditches. Other volatile organic compounds were detected in surface water from RCI ditch.

Semivolatile compounds were not detected in surface water samples with the exception of one sample from the RCI ditch. Semivolatiles included p-tert-butyphenol, pentachlorophenol, and 2,3,4,6-tetrachlorophenol.

Inorganic constituents were detected in all surface water samples from the south, southeast, and RCI ditches. Arsenic, copper, lead, and nickel were detected at elevated concentrations relative to other samples taken in the vicinity. The highest concentrations of metals occurred in the southeast and RCI ditches.

Ditch Sediment Quality. Sediment samples were collected in association with surface water samples from ditches. Nine sediment sample locations in each ditch segment were composited into three samples for each segment.

A few volatile and semivolatile compounds were detected. These included acetone and methylene chloride (suspected to be laboratory contamination), several PAH compounds, benzoic acid, and two phthalates. Arsenic, copper, lead, molybdenum, and zinc were also detected at elevated concentrations.

Two pesticides, 2,4-dichlorophenoxy acetic acid (2,4 D) and 2,4,5-trichlorophenoxy acetic acid (Silvex) were found in sediment samples from the south ditch (see Figure 7) because these pesticides were not detected in duplicate samples.

Soil Quality

Soil samples were collected by CH2M Hill (1988) and Landau Associates (1984) from four locations on Blair Backup Property. Sampling was conducted as part of both companies hazardous waste permit applications. The sampling sites are located south and southeast of Reichhold Chemical Company and west of Kaiser Aluminum and Chemicals properties.

CH2M Hill's work entailed a number of soil borings (composite intervals of 0- to 3- and 3- to 6-foot depths) from three sites designated as areas 33, 44, and 49 (see Figure 7). These sites, known as solid waste management units or SWMUs, have been identified as possible waste disposal areas used by Reichhold in the 1960s and 1970s (CH2M Hill, 1988B). Soil samples were analyzed for volatile, semivolatile, pesticide/PCBs, and lead. Landau Associates sampled sludge and soil from the Kaiser Aluminum settling pond, a portion of which is located on the Blair Backup Property. Sludge and soil samples were analyzed for polycyclic aromatic hydrocarbons (PAHs).

Area 33. Organic compounds and lead were detected in both the upper and lower sampling

intervals. Acetone and toluene were the only volatile organic detected in soil samples. Acetone was detected in only one borehole location from both depth intervals. Toluene was detected in two composites samples. Two soil boring samples contained phenol and 2,4-dichlorophenol. Phenol occurred in the lower sampling interval, while 2,4-dichlorophenol occurred in upper interval. PCB 1248 was detected in two soil borings from the upper depth interval. Lead was detected at elevated concentrations in soil samples from both the upper and lower depths.

Area 44. Volatile organics and lead were in both soil boring depth intervals. Volatiles included acetone, toluene, and 2-butanone. Acetone and toluene were detected in both the upper and lower sampling intervals. Lead was detected at elevated concentrations in both the upper and lower soil samples.

Area 49. Volatile organic compounds detected include acetone, 2-butanone, toluene, and trichloroethene. Distribution of volatiles was erratic throughout Area 49. Acetone was detected in one sample in the upper sampling interval and two lower sampling intervals. 2-butanone was detected in one lower sample interval. Toluene was found in one sampling location in both upper and lower intervals. Trichloroethene was detected in one sample from the lower interval. Pentachlorophenol was detected in the majority of soil samples from both the upper and lower sampling intervals. PCB 1248 was detected in four soils sample and

was present in both sampling intervals. Lead was detected in soil samples in both depth intervals.

Kaiser Settling Pond. Sludge and soil samples were collected as part of the Kaiser Aluminum effort to establish a final criteria for cleanup of PAHs in the Kaiser Aluminum settling pond (see Figure 7). Two phases of sampling occurred at the settling pond. The first phase was completed to define specific limits of sludge for sludge removal. Results indicated that PAH concentrations varied from less than 10 to about 1,000 ppm. As part of a post-cleanup sampling effort, Landau Associates (1984) collected soil and sludge samples from with the settling pond. All samples were composites. Samples from the Blair Backup Property had PAH concentrations up to 175 ppm.

Ohio Ferro-Alloys. The area which Ohio Ferro-Alloys occupied is now a log sort yard. Some Asarco slag is evident on this site. During test pit explorations in 1986, some waste materials were observed (Hart Crowser, 1986). The chemical characteristics of these materials are unknown.

The work conducted by EPA (Ecology and Environment, 1987) indicates the presence of metals and some organic compounds in soil and groundwater at the Ohio Ferro-Alloys site. It is unclear whether the detected contamination is a result of Ohio Ferro-Alloys operations or more other activities such as waste disposal on the Pennwalt Ag Chem site.

SITE RECONNAISSANCE

The site was visited three times during the course of our work. John Funderburk and Philip Spadaro visited the site in November 1988 as part of our proposal effort. Mr. Funderburk visited the site again on May 2, 1989. Mr. Spadaro visited the site for a second time on May 10, 1989. During each of these visits, the site was traversed by foot to make note of its features and verify findings of site history or agency file reviews. Listed below are the salient observations recorded during our visits. These features and the photograph locations are shown on Figure 7. Photographs corresponding to the text references are found in Appendix A.

General Terrain

The site is generally level and open with access from roads at several points. The northern side of the property is covered with dense scrub vegetation. The site is drained by a series of ditches which run to either the Blair or the Hylebos Waterways.

Recent Filling Activity

There are two areas on the site where recent filling has occurred. The first is near Alexander Avenue where soil fill has been deposited in a low area (Figure 7). The area adjacent to this fill is seasonally flooded (see Photographs 1 and 2).

The second area of recent fill is on the northern portion of the property where construction debris and soil believed to be from repaving of Taylor Way has been deposited. Some of this soil has a hydrocarbon odor (see Photograph 3).

Drainage Ditches

Surface water from the site drains via a series of drainage ditches. These ditches generally enter culverts to cross under Alexander Avenue or Taylor Way and drain to the Blair or Hylebos Waterways. The property near Reichhold generally drains to the Blair and the property near Kaiser generally drains to the Hylebos. The ditch running along the property boundary with Reichhold Chemical has been sampled (CH2M Hill, 1989B). A summary of the chemical results are given earlier in this report. During our site visit in November 1988, we observed substantial oil sheening on the water in the ditch (see Photograph 5). During subsequent site visits, we did not observe as much sheen. On at least one area along the banks of the ditch, discolored (white) soil and possibly waste material are evident (see Photographs 6 and 7).

The drainage ditch terminates in a settling basin (Photographs 15 and 16) which is located at the end of a linear strip of land in the northwestern-most reach of the parcel. The accumulated water in the lagoon/basin held a thin petroleum sheen and considerable scum buildup in areas.

Miscellaneous Wastes

During our site visits, we observed several types of waste materials deposited on the ground surface. These included:

- o Household trash;
- o Sand blast grit; and
- o Small oil or creosote spills.

The areas where these materials exist are shown on Figure 7.

Steam-Cleaning Area

The current occupant of the northern part of Blair Backup Property is operating a steam-cleaning and maintenance area (Photograph 13). Runoff from this area has caused surface soil staining. The staining may be indicative of oil accumulations.

Log Sorting Area

The eastern part of the site was free of log piles during our May 1989 visits. Observation of open excavations in this area indicated considerable slag in the upper 4 feet of soil.

Underground Storage Tanks (USTs)

Evidence of an underground fuel storage tank was observed on the northern portion of the site (see Photograph 17). The age, size, and exact contents of this tank are currently not known.

Other Observations

During the May 1989 site reconnaissance, an excavation was observed in progress across Taylor Way from the Blair Backup Property. A City of Tacoma Water Department crew was digging up and replacing a waterline (Photograph 11). A conversation with the foreman of this crew determined that a groundwater seep was entering the excavation pit from a southwesterly direction through a concrete pipe which traversed Taylor Way in the direction of the project property. The concrete pipe serves as a conduit for the water main. The foreman indicated a brown liquid (Photograph 12) had been seeping into the pit from the conduit for over a 24-hour period. A field test of the liquid using pH paper indicated a pH of 12. This finding suggests a potential groundwater contamination from alkaline material in the vicinity of the Blair Backup Property.

CONCLUSIONS AND RECOMMENDATIONS

Based on the work performed to compile this report, we believe there are several substantive environmental issues related to the Blair Backup Property. We have listed these below.

- Soil and groundwater contamination related to the Reichhold Facility;
- Soil and groundwater contamination related to the Kaiser wet scrubber sludge management area;

- Residual soil and groundwater contamination from Ohio Ferro-Alloys;

- Potential soil and groundwater contamination from use of Asarco slag mixed with wood waste on log sorting areas on the site;

- Potential soil and groundwater contamination resulting from operations at the Pennwalt pesticides laboratory;

- Potential soil contamination in recently imported fill or debris; and

- Potential soil and groundwater contamination from steam-cleaning and truck repair and a UST.

Two of these issues, Reichhold and Kaiser, are currently at various stages of assessment and cleanup. In these cases, we recommend that the Port maintains close scrutiny over the work being conducted to assure acceptable final cleanup levels are achieved. The Port's efforts would be best focused on the planning of future exploration, sampling and analysis, or corrective action programs.

Relative to the other issues, we recommend that the Port implement a program of soil and groundwater sampling, and analysis to assess the extent and magnitude of contamination, if present. If significant contamination is found, cleanup options should be considered.

In particular, we recommend the following.

Sample and Analyze Soils:

- Near the UST,
- Near steam-cleaning operations,
- In areas of sand blast grit disposal,
- In areas of oil spills,
- On Ohio Ferro-Alloys site,
- In recently imported fill, and
- In ditch near discolored soil.

Install Groundwater Monitoring Wells:

- Along boundary with Reichhold where no wells exist,
- Near Pennwalt pesticides laboratory, and
- On Ohio Ferro-Alloys/log sort yard site (and obtain access to EPA wells).

These actions would constitute the second phase of the environmental audit process as shown on Figure 2. Based on the results of the recommended sampling and analysis, the need for and feasibility of cleanup could be established.

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AWARE, Inc., November 1981. Hydrogeologic and Engineering Evaluations of Waste Management Facilities prepared for Pennwalt Corporation.

CH2M Hill, February 1987A. Preclosure Investigation and Hydrogeologic Assessment Report prepared for Reichhold Chemicals, Inc.

CH2M Hill, May 1987B. Groundwater Assessment Report prepared for Reichhold Chemicals, Inc.

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CH2M Hill, February 1989B. Sediment and Surface Water Report: Offsite Drainageways prepared for Reichhold Chemicals, Inc.

CH2M Hill, March 1989C. Offsite Soils Investigation Report prepared for Reichhold Chemicals, Inc.

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CH2M Hill Northwest, Inc., April 25, 1989. Reichhold Tacoma Facility, Summary of January 1989E Precorrective Action Groundwater Monitoring Results prepared for Reichhold Chemicals, Inc.

CH2M Hill, March 1989F. Work Plan - Unit 50 Soil Samples prepared for Reichhold Chemicals, Inc.

CH2M Hill, March 1989G. Work Plan - Unit 49 Additional Soil Sampling prepared for Reichhold Chemicals, Inc.

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Hart Crowser, Inc., December 5, 1986. Results of Subsurface Explorations and Metals Testing, Cascade Timber Yard No. 2, Tacoma, Washington, prepared for Port of Tacoma.

Landau Associates, Inc., March 1987A. Dangerous Waste TSD, Permit Application prepared for Kaiser Aluminum & Chemical Corporation Tacoma Works.

Landau Associates, Inc., July 1987B. Final Ground Water Monitoring Report, Kaiser Wet Scrubber Sludge Management Area, Kaiser Tacoma Works, Tacoma, Washington, prepared for Kaiser Aluminum & Chemical Corporation.

Table 1 - Known On-site Industrial/Commercial Activity

Ohio Ferro-Alloys	3002 Taylor Way	1941-1974
Port of Tacoma	3002 Taylor Way	1975-1987
Puyallup Indian Tribe	3002 Taylor Way	1987-1988
Casscade Timber No. 2	Taylor Way	1983-1984

Table 2 - Known Adjacent Industrial/Commercial Activity

Justus Pre-fabrication	2116 Taylor Way	1950s
American Industries	2116 Taylor Way	1960s
Thermolite Insulation	2116 Taylor Way	1960s
Superlon Plastics	2116 Taylor Way	1970s-present
Western Turnings	2150 Taylor Way	1970s-1980s
Foundry	2200 Taylor Way	1950s
Acme Foundry	2240 Taylor Way	1950s-1960s
Reichhold Chemical (lab)	2240 Taylor Way	1960s-present
Woodtone Staining	2240 Taylor Way	1980s
Fields Products	2240 Taylor Way	1980s
Canteen Vending	2301 Taylor Way	1940s
Independent Insulation	2301 Taylor Way	1940s
Sherwin-Williams (lab)	2301 Taylor Way	1940s
Feltrok Insulation	2301 Taylor Way	1950s
American Rock Wool	2301 Taylor Way	1950s
U.S. Gypsum	2301 Taylor Way	1960s-present
Pennwalt Corporation	2901 Taylor Way	1929-1989
Wypenn Oil (fish oil)	2902 Taylor Way	1937-1950s
Western Charcoal	2902 Taylor Way	1940s
Pennwalt Chemical (lab)	2902 Taylor Way	1960s-1980s
Johnson Byers Log Products	3001 Taylor Way	1960s-1970s
Dunlap Towing	3001 Taylor Way	1980s
Weyerhaeuser Co. Chip Yard	3001 Taylor Way	1980s
Petroleum Refining	3003 Taylor Way	1980s
Olin Corporation	3400 Taylor Way	1943-1946
Kaiser Aluminum	3400 Taylor Way	1946-1989
Reichhold Chemical	3320 Lincoln Avenue	1950s-1980s
Tacoma Sash & Door	3376 Lincoln Avenue	1950s
George Katica Kiln	3376 Lincoln Avenue	1960s
Western Turnings	3376 Lincoln Avenue	1970s
American Lumber	3376 Lincoln Avenue	1970s
Educators Manufacturing	3401 Lincoln Avenue	1960s-1980s
Huserman Furniture	3401 Lincoln Avenue	1980s
Accurate Packaging	3405 Lincoln Avenue	1960s-1970s

Location Map

Port of Tacoma Properties Identified for Environmental Audit

Taylor Way Properties

Blair Backup Property

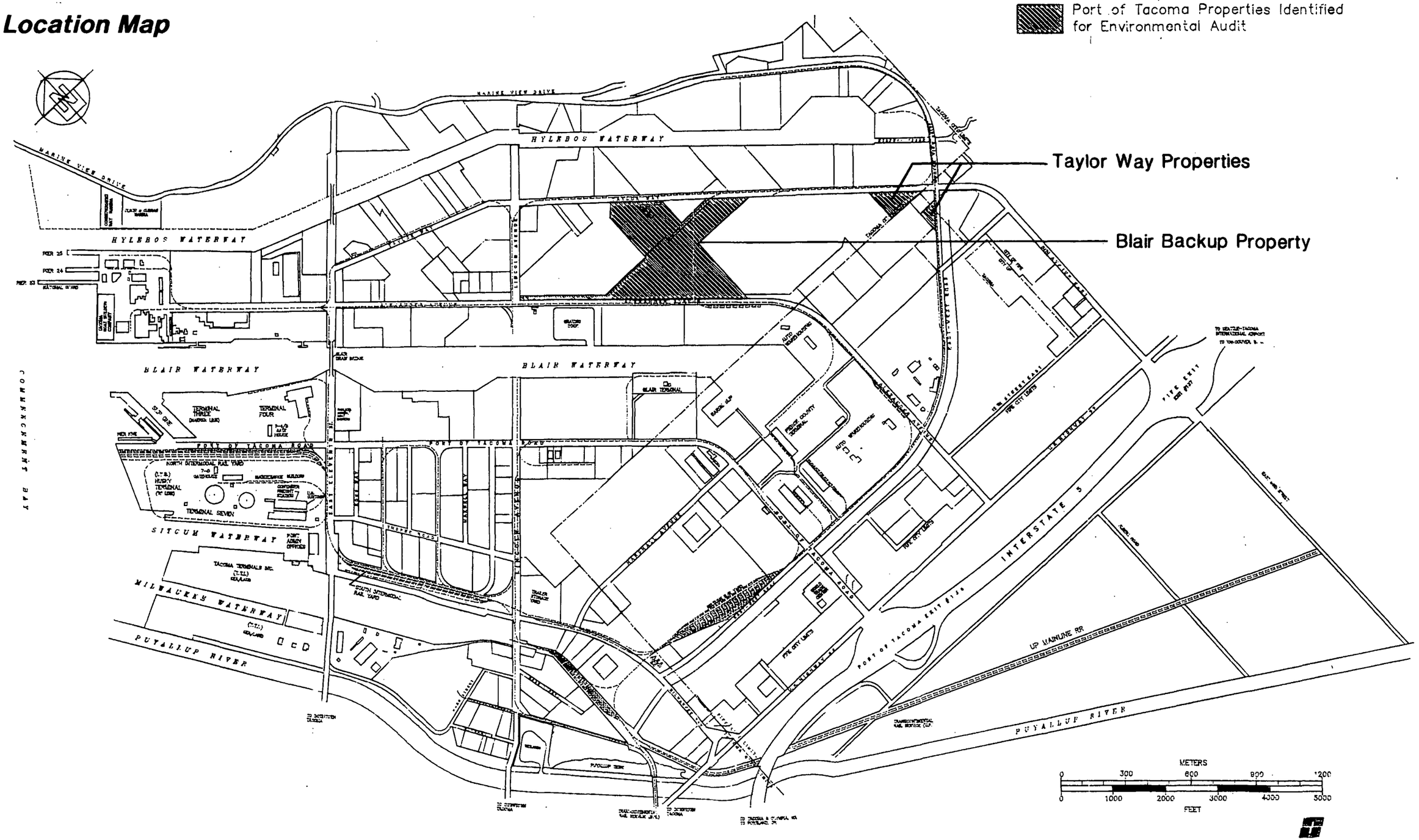

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Figure 1

Environmental Assessment for Property Transfer Process

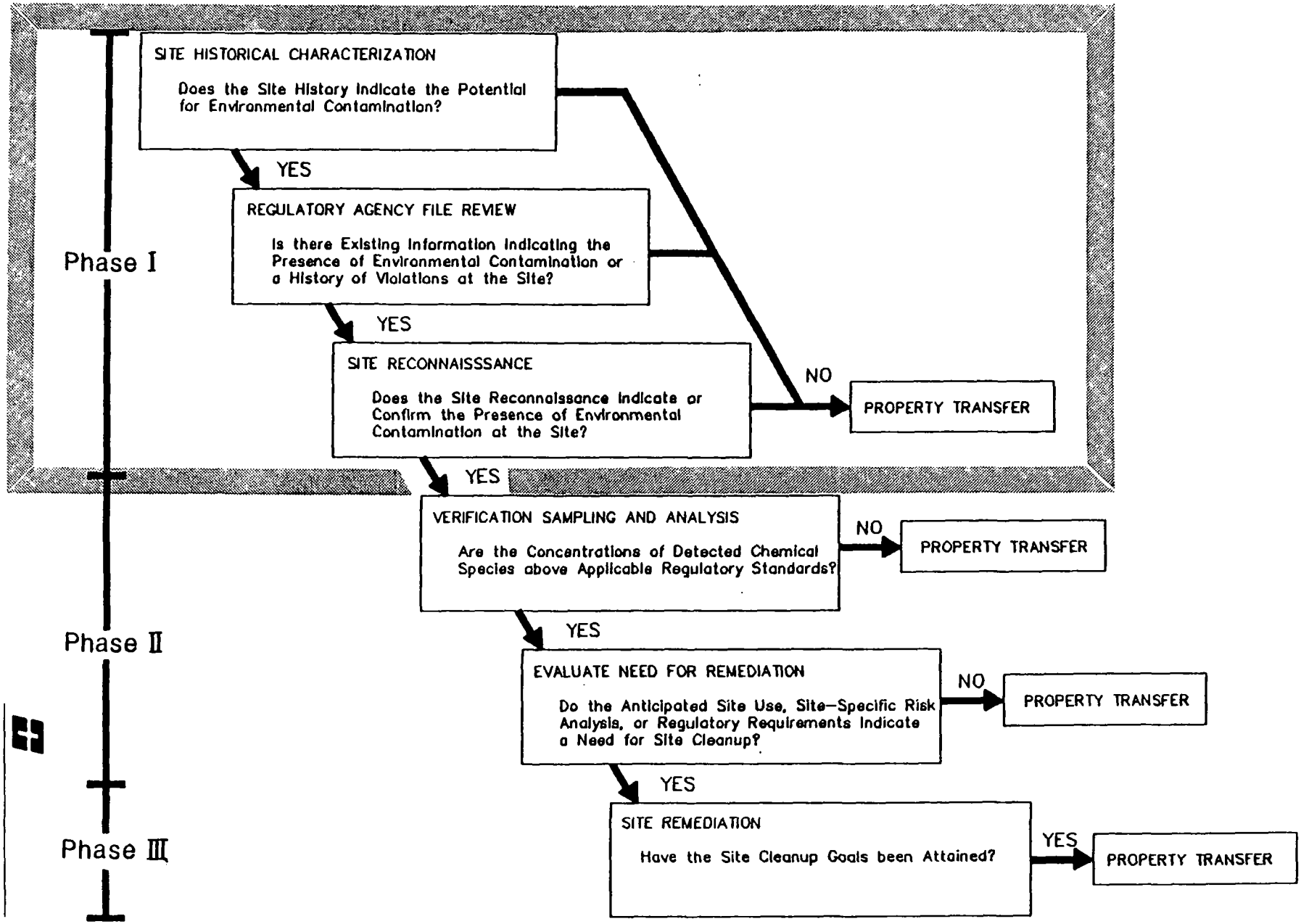

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Figure 2

Historic Business Activity Map 1929–1989

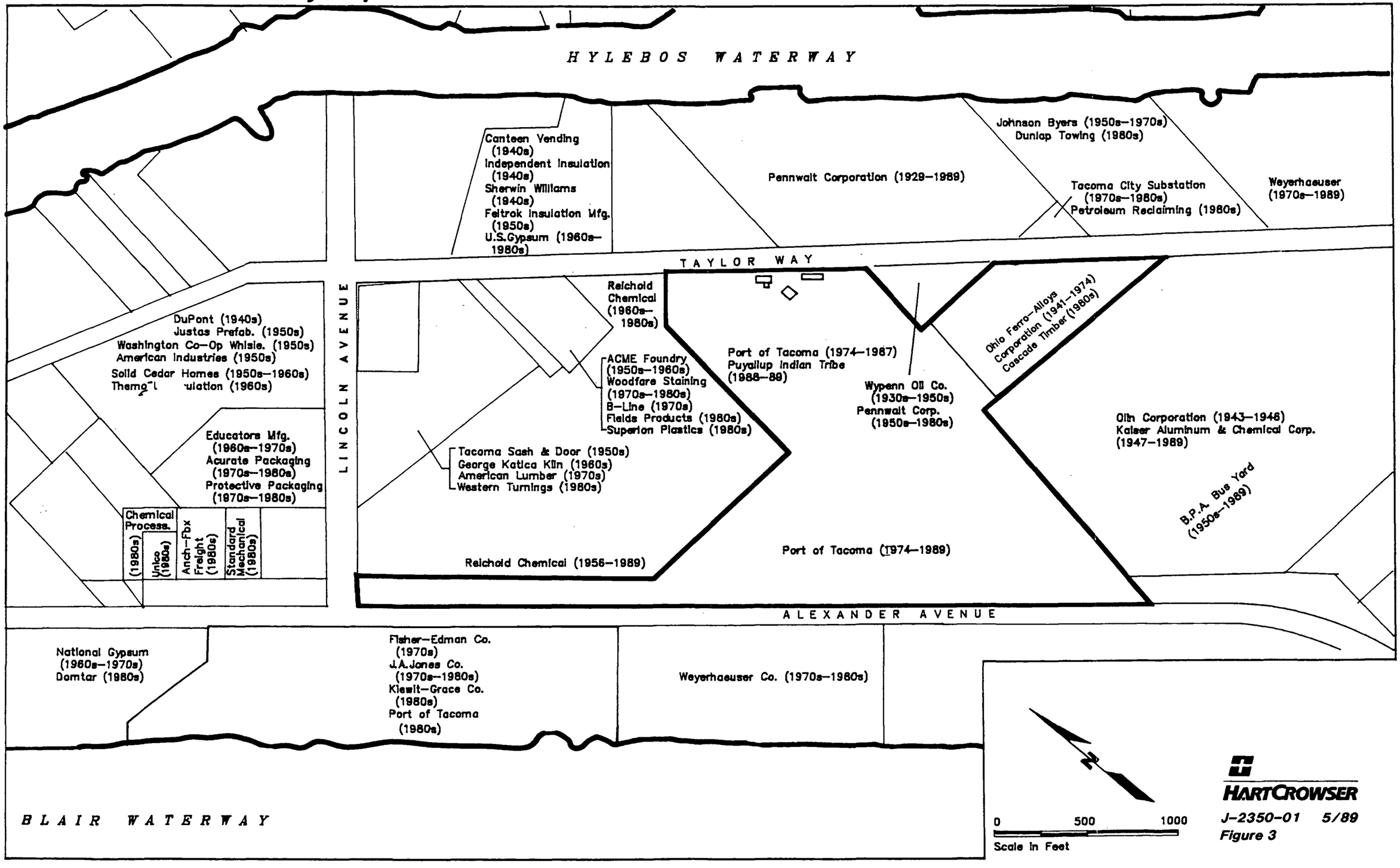

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Figure 3

Generalized Groundwater Flow Direction Map

Shallow Aquifer

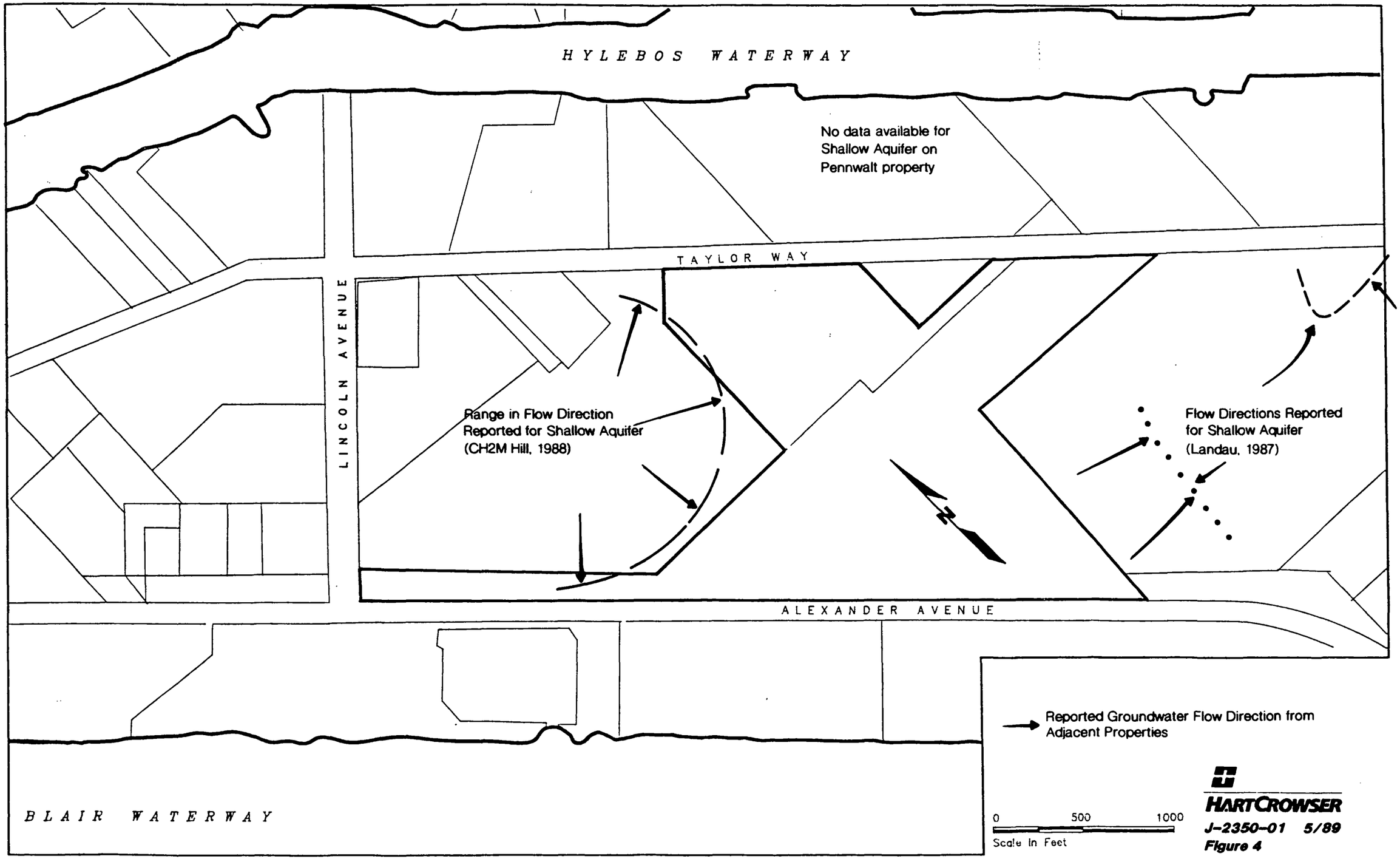

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Figure 4

Generalized Groundwater Flow Direction Map

Intermediate Aquifer

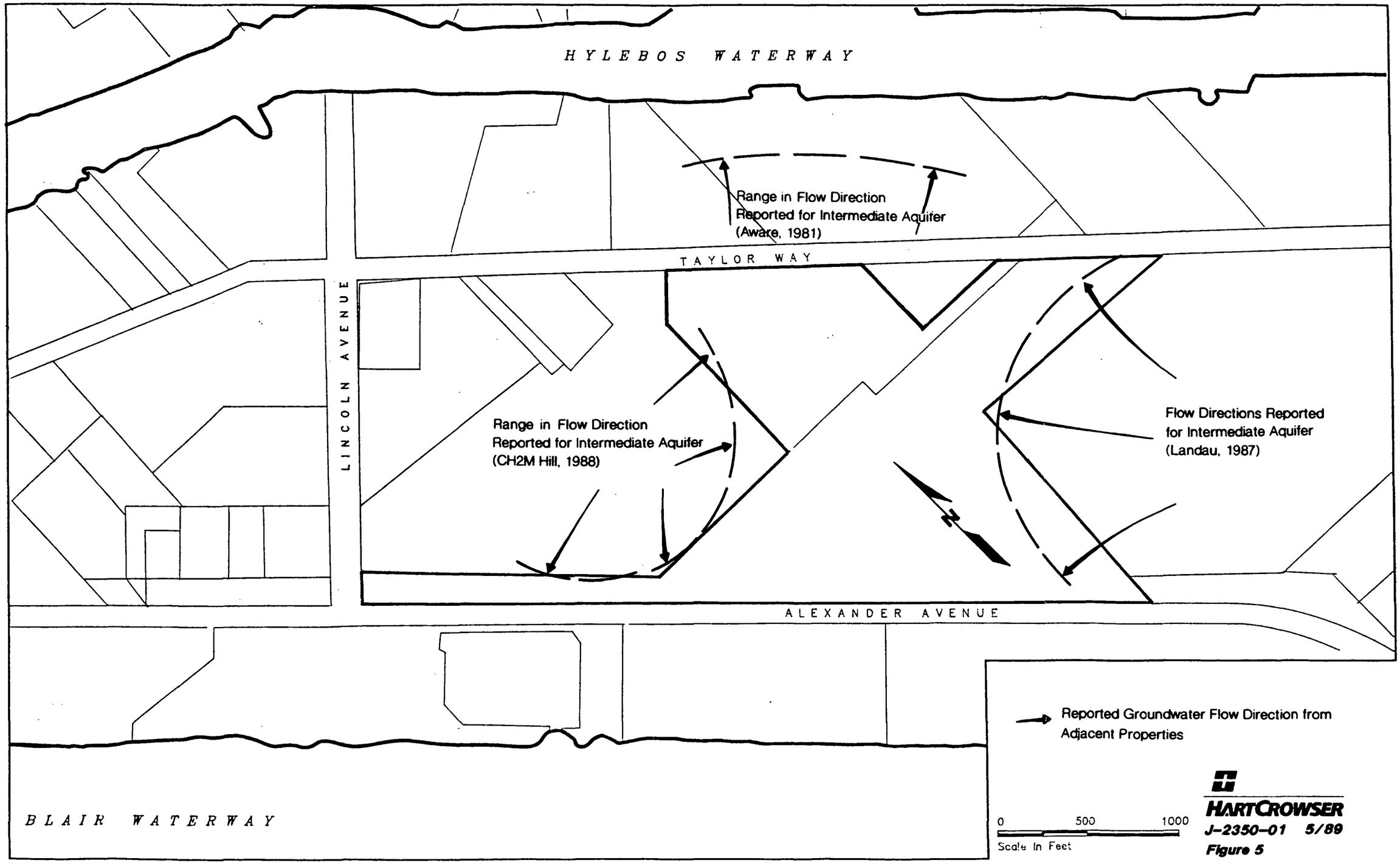

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Figure 5

Generalized Groundwater Flow Direction Map

Deep Aquifer

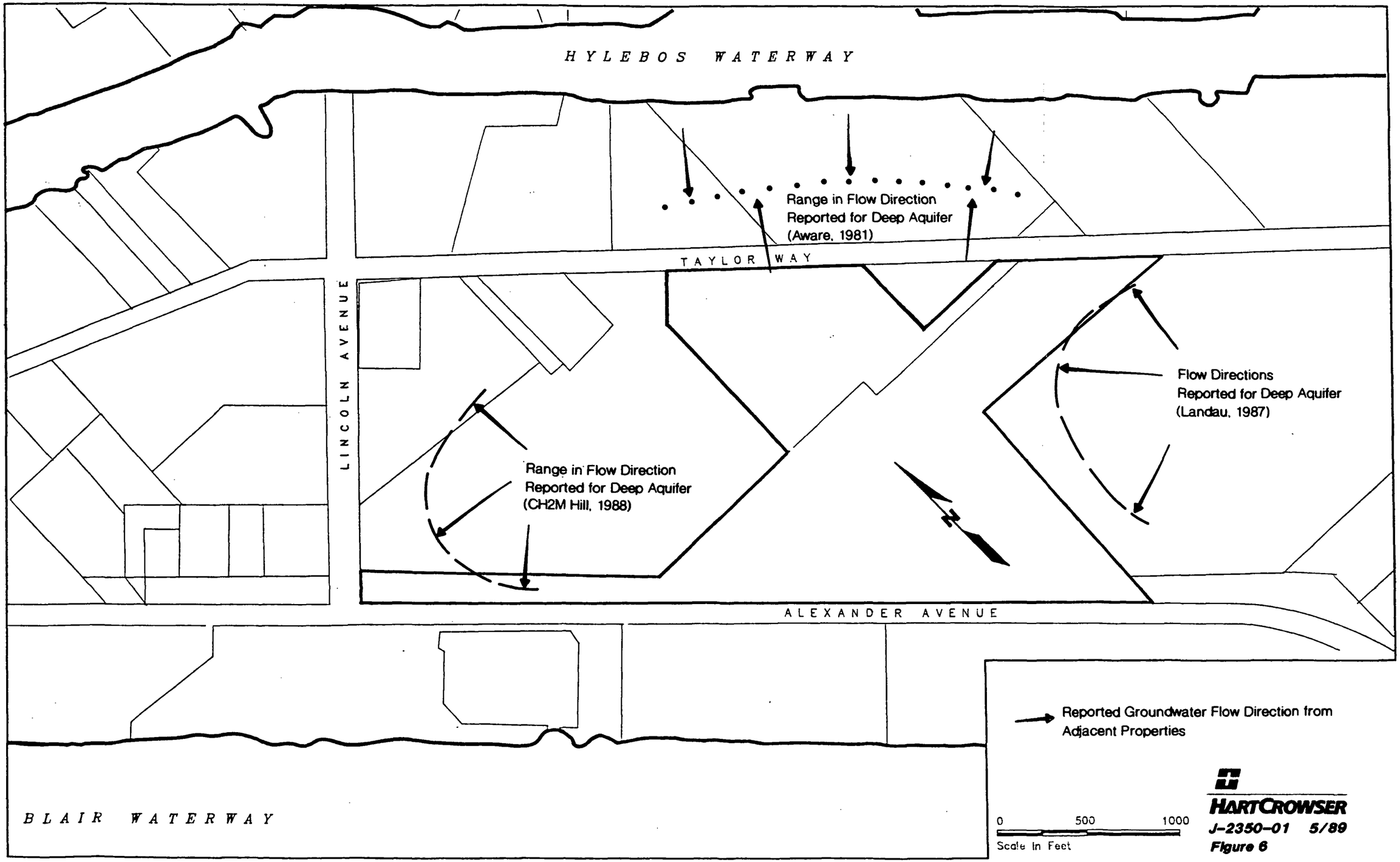

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Figure 6

Site Reconnaissance Observations Map–November 1988

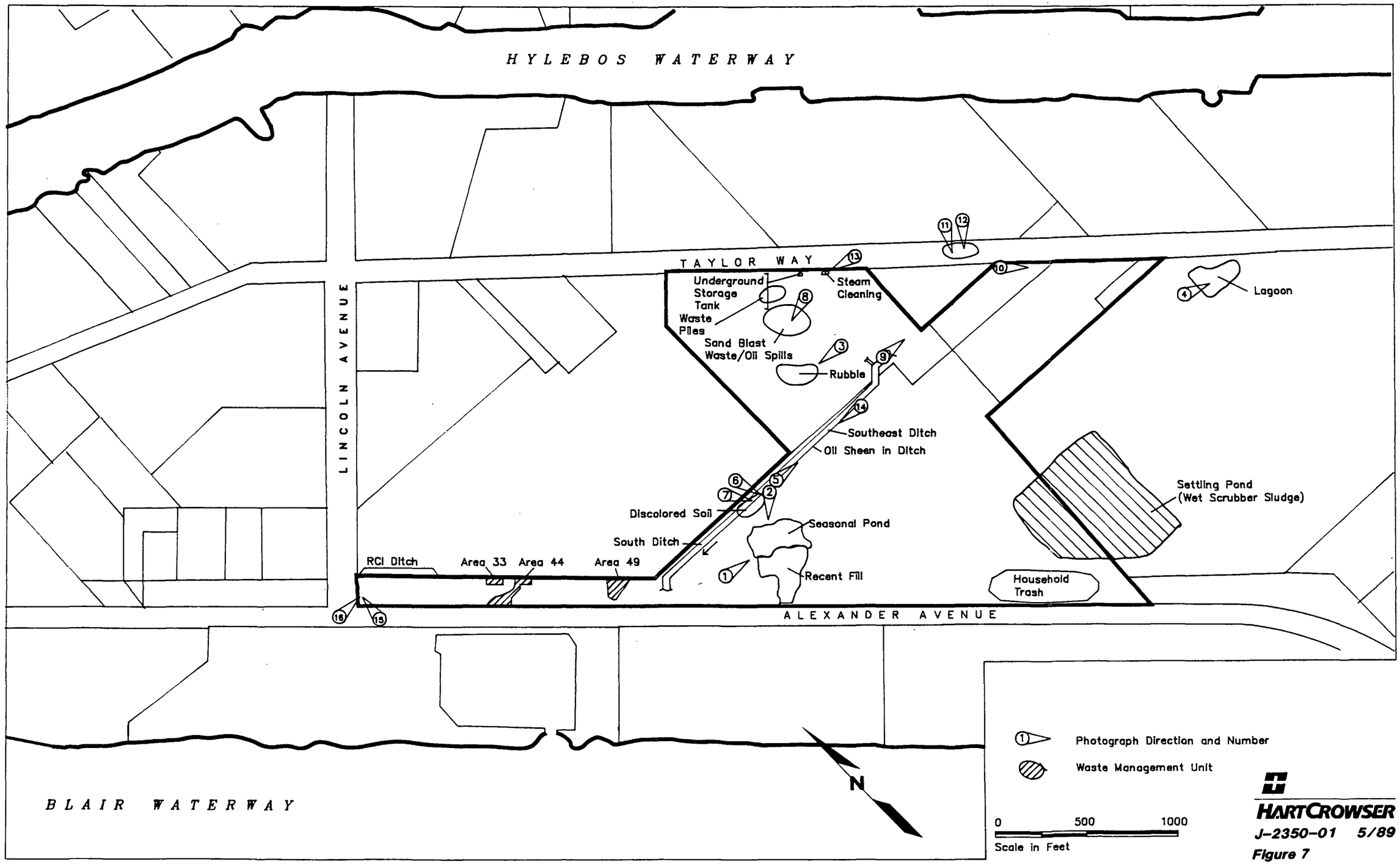

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Figure 7

Site Plan Showing Existing Wells

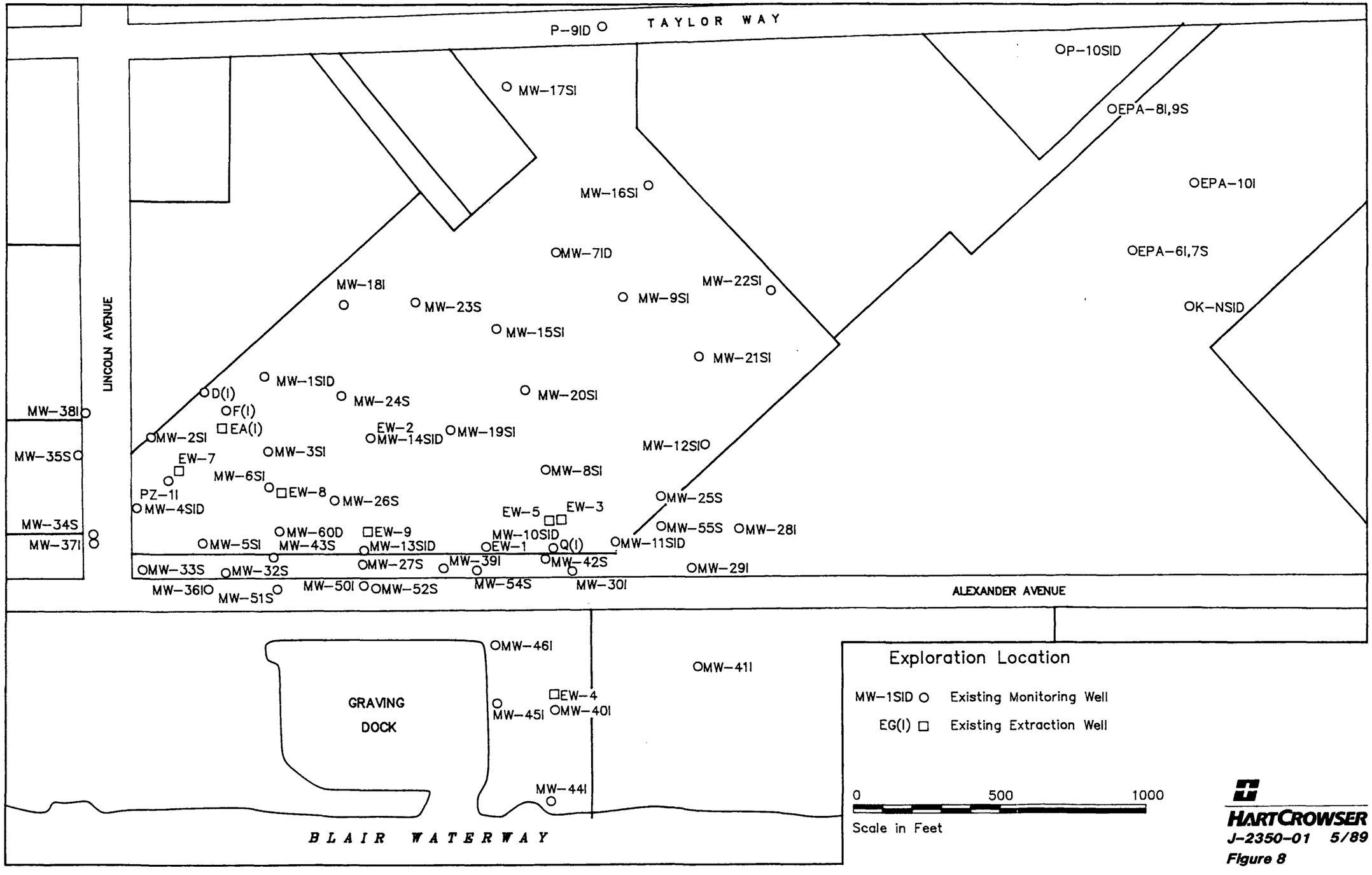

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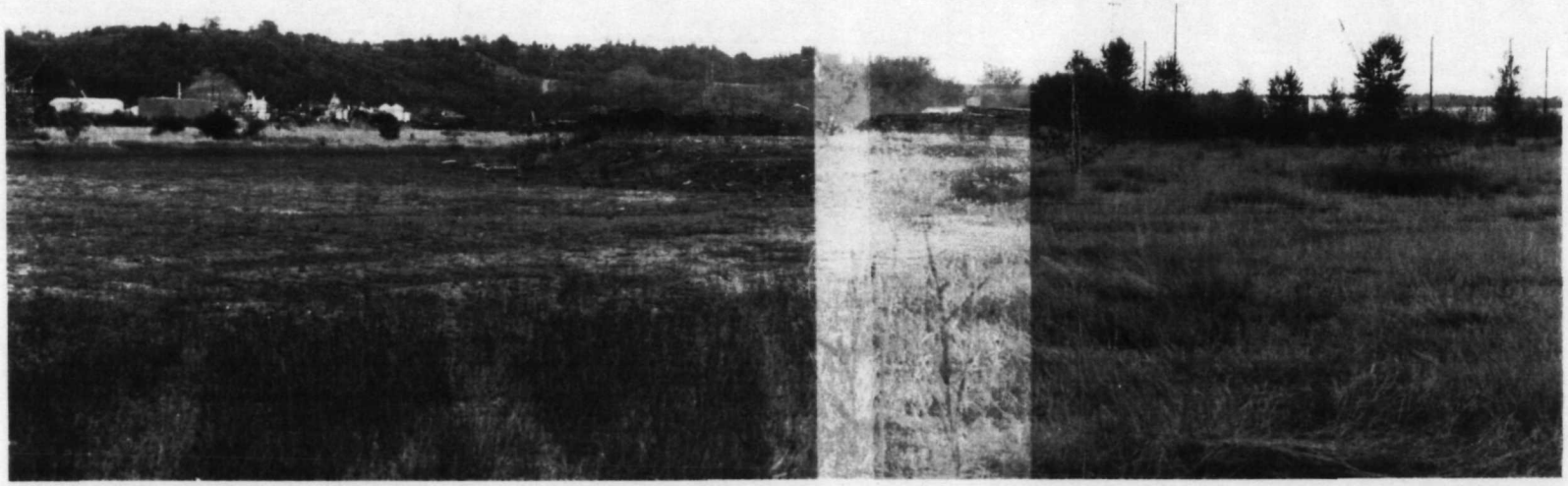
Figure 8

APPENDIX A
SITE RECONNAISSANCE PHOTOGRAPHS



Photograph 1 – Recent fill and area of seasonal ponding (November 1988).

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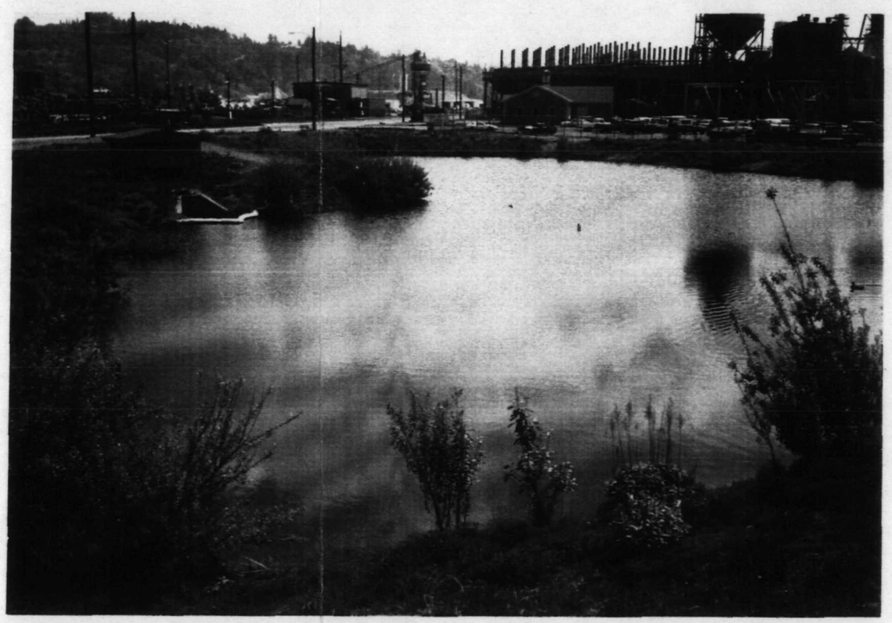
Photograph 2 – Blair back up: Ponded water in area (May 1989) detailed in Photograph 1.

Photograph 3 – Blair back up: Construction debris and rubble fill material.



Photograph 4 – Blair back up: Lagoon area in eastern corner of Blair back up.

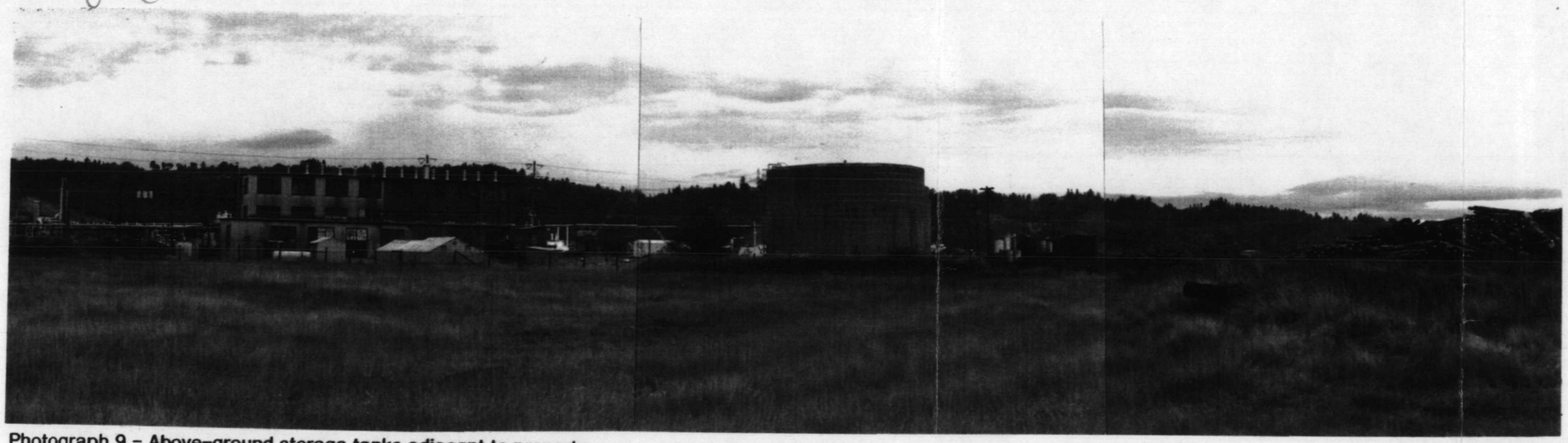
Photograph 5 – Oil sheen in ditch.

Photograph 6 – Blair back up: Area along ditch, seep.

Photograph 7 – Blair back up: Area along ditch, white material disturbed in sediment near seep in Photograph 6.

Photograph 8 – Green soil.

looking which direction (which facility is this?)



Photograph 9 – Above-ground storage tanks adjacent to property.

Photograph 10 – Log storage yard.

Photograph 11 - Off-site Construction: Northeast of Blair back up on Taylor Way. Arrow details close-up area in photograph 12.

Photograph 12 - Off-site Construction: Northeast of Blair back up on Taylor Way. Arrow shows groundwater seep. Material shows ph of 12 using litmus test strip.

Photograph 13 – Steam cleaning trucks, soil areas visibly stained.

is there a sheen?

Photograph 14 – Blair back up: Ditch draining property.

Photograph 15 - Blair back up: Settling basin/low area for ditch (Photograph 14) draining property which travels through pipeline.

Photograph 16 - Blair back up: Settling basin/low area for ditch draining property. Arrow shows connection with drainage ditch/pipeline.

Photograph 17 - Underground and above-ground tanks.